Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Previously presented) An optical head comprising:

a semiconductor laser;

an objective lens for focusing a light beam from the semiconductor laser onto an information recording medium;

a light beam separator that is located between the semiconductor laser and the objective lens, includes interference regions for light that is reflected from the information recording medium and travels in a straight path and ± first-order diffracted light produced by information tracks of the information recording medium, and diffracts each of plural light beams in regions of the interference regions, where an amount of light is changed by a change in a relative angle between the information recording medium and the objective lens and by a shift of the objective lens in a radial direction of the information recording medium;

a light-receiving element that receives the light beam that is reflected by the information recording medium and separated by the light beam separator, and converts the light beam to an electrical signal; and

an arithmetic circuit that corrects a value of the electrical signal detected by the light-receiving element in accordance with a radial position signal corresponding to an amount of shift of the objective lens in the radial direction of the information recording medium, and detects the relative angle between the information recording medium and the objective lens or an amount of tilt of the information recording medium with respect to a predetermined reference plane.

2. (Previously presented) The optical head according to claim 1, wherein the light beam separator diffracts part of each of the light beams in the interference regions.

3. (Original) The optical head according to claim 1, wherein the plural light beams are present in four regions of the light beam separator, the four regions are separated from each other by an axis in the radial direction and an axis in a tangential direction, and the two axes pass through a substantial center of the light that is reflected from the information recording medium and travels in a straight path.

4. (Original) The optical head according to claim 1, further comprising an objective lens drive for driving the objective lens in the radial direction and a focusing direction,

wherein the radial position signal is calculated by using an applied current to drive the objective lens in the radial direction.

5. (Previously presented) The optical head according to claim 1, wherein the radial position signal is produced by calculating amounts of light in at least two regions of the light beam separator, and the at least two regions are outside the interference regions and are separated from each other by an axis in a tangential direction passing through a substantial center of the light that is reflected from the information recording medium and travels in a straight path.

6. (Original) The optical head according to claim 1, wherein the light beam separator is a hologram or a diffraction grating made of resin or glass.

7. (Original) The optical head according to claim 1, wherein the light beam separator comprises a $\lambda/4$ plate and a polarizing hologram that is located between the $\lambda/4$ plate and the semiconductor laser and has a diffraction effect only for a light beam of a predetermined polarization component, and the light-receiving element receives the light beam diffracted by the polarizing hologram.

8. (Original) The optical head according to claim 1, wherein the light beam separator is integrated with the objective lens and moved together with the objective lens in a focusing direction and the radial direction.

9. (Original) The optical head according to claim 1, further comprising a collimator lens between the objective lens and the semiconductor laser, wherein the collimator lens is integrated with the light beam separator.

10. (Previously presented) An optical head comprising:

a semiconductor laser;

an objective lens for focusing a light beam from the semiconductor laser onto an information recording medium;

a light beam reflection portion that reflects the light beam from the semiconductor laser and moves together with the objective lens;

a light-receiving element that includes a light-receiving region for receiving the light beam reflected by the light beam reflection portion; and

an arithmetic circuit that detects the amount of tilt of the objective lens with respect to a predetermined reference plane by using an electrical signal detected by the light-receiving element and a radial position signal corresponding to the amount of shift of the objective lens in the radial direction.

11. (Previously presented) The optical head according to claim 10, wherein the light beam reflection portion is formed in an objective lens holder for holding the objective lens.

12. (Previously presented) The optical head according to claim 10, further comprising an objective lens drive for adjusting the inclination angle of the objective lens and a second light-receiving element for receiving a light beam reflected by the information recording medium,

wherein the relative angle between the information recording medium and the objective lens is detected by using an electrical signal detected by the second light-

receiving element and the electrical signal of the light-receiving element while adjusting the inclination angle of the objective lens by the objective lens drive.

13. (Previously presented) The optical head according to claim 10, further comprising an objective lens drive for driving the objective lens in the radial direction and the focusing direction,

wherein the radial position signal is calculated by using an applied current to drive the objective lens in the radial direction.

14. (Currently amended) The optical head according to claim 10, further comprising a light beam separator that is located between the semiconductor laser and the objective lens,

wherein the ~~radical~~ radial position signal is produced by calculating the amounts of light in at least two regions of the light beam separator, and the at least two regions are outside interference regions for light that is reflected from the information recording medium and travels in a straight path and ± first-order diffracted light produced by information tracks of the information recording medium and are separated from each other by an axis in the tangential direction passing through a substantial center of the light that is reflected from the information recording medium and travels in a straight path.

15. (Previously presented) An optical head comprising:

a semiconductor laser;

an objective lens for focusing a light beam from the semiconductor laser onto an information recording medium;

a light beam separator that is located between the semiconductor laser and the objective lens and forms a plurality of light spots on the information recording medium;

a light-receiving element that receives a light beam of each of the light spots reflected by the information recording medium, and converts received light to an electrical signal; and

an arithmetic unit that calculates the electrical signal converted by the light-receiving element, and detects the relative angle between the information recording medium and the objective lens.

16. (Previously presented) The optical head according to claim 15, further comprising an objective lens drive for driving the objective lens in the radial direction and the focusing direction,

wherein rotational adjustment of the light beam separator with respect to the information recording medium is performed by rotating the objective lens drive around a central axis of the objective lens, and an arrangement of the light spots on the information recording medium is adjusted by the rotational adjustment.

17. (Previously presented) The optical head according to claim 15, wherein the light beam separator is a hologram or a diffraction grating.

18. (Previously presented) An optical head comprising:

a semiconductor laser for emitting divergent light:

an objective lens for focusing the divergent light from the semiconductor laser onto an information recording medium;

a light beam reflection portion that reflects a portion of a light beam traveling substantially outside an effective light beam diameter of the objective lens onto the information recording medium;

a light-receiving element including at least two light-receiving portions, each of which receives the light beam that is reflected by the light beam reflection portion and then is reflected by the information recording medium; and

an arithmetic unit that calculates the amount of light entering the light-receiving element, and detects the amount of tilt of the information recording medium with respect to a predetermined reference plane.

19. (Previously presented) The optical head according to claim 18, further comprising an optical base for holding the semiconductor laser,

wherein the optical base is made of metal or resin, the light beam reflection portion is formed integrally with the optical base, and a light reflection film is formed on the light beam reflection portion.

20. (Previously presented) The optical head according to claim 19, wherein the optical base is made of resin and formed integrally with the light beam reflection portion made of glass.

21. (Previously presented) The optical head according to claim 18, wherein the light beam reflection portion is a light reflection film formed by deposition or application.

22. (Previously presented) An optical head comprising:

a semiconductor laser for emitting divergent light;

an objective lens for focusing the divergent light from the semiconductor laser onto an information recording medium;

a collimator lens located between the semiconductor laser and the objective lens;

a light beam reflection portion that reflects part of a light beam traveling substantially outside an effective light beam diameter of the objective lens or the collimator lens onto the information recording medium;

a light-receiving element including at least two light-receiving portions, each of which receives the light beam that is reflected by the light beam reflection portion and then is reflected by the information recording medium; and

an arithmetic unit that calculates the amount of light entering the light-receiving element, and detects the amount of tilt of the information recording medium with respect to a predetermined reference plane.

23. (Previously presented) The optical head according to claim 22, wherein the light beam reflection portion is placed substantially outside an effective light beam diameter of the collimator lens and formed integrally near the exterior of the collimator lens.

24. (Previously presented) The optical head according to claim 22, wherein the light beam reflection portion is formed by deposition, application, or coating of an aluminum reflection film or light reflection film near the exterior of the collimator lens.

25. (Previously presented) An optical head comprising:

a semiconductor laser;

an objective lens for focusing a light beam from the semiconductor laser onto an information recording medium;

an objective lens drive for driving the objective lens;

a voltage controller for applying a voltage to the objective lens drive so that the objective lens is driven in a focusing direction;

a light-receiving element that receives a light beam reflected from the information recording medium and produces a focusing error signal; and

an arithmetic unit that detects a relative position of the information recording medium with respect to a predetermined reference position in the focusing direction, and calculates at least one selected from the relative angle between the information recording medium and the objective lens, the amount of tilt, the amount of warping, and the cross-sectional shape of the information recording medium by using a driving signal applied to the objective lens drive by the voltage controller and a focusing error signal produced by the light-receiving element.

26. (Previously presented) The optical head according to claim 25, wherein the reference position is any one selected from a turntable for holding the information recording medium, part of the optical head, and a guide shaft of the optical head.

27. (Previously presented) The optical head according to claim 25, wherein the driving signal from the voltage controller is any one selected from a triangular wave, a sine wave and a trapezoidal wave.

28. (Previously presented) The optical head according to claim 25, wherein the arithmetic unit detects relative positions of the information recording medium with

respect to the reference position in the focusing direction in at least two different portions of the information recording medium in the radial direction, and calculates at least one selected from the amount of tilt of the information recording medium, the relative angle between the information recording medium and the objective lens, the amount of warping and the cross-sectional shape of the information recording medium by using the relative positions.

29. (Previously presented) The optical head according to claim 28, wherein at least one selected from the amount of tilt corresponding to the calculated radial position of the information recording medium, the relative angle between the information recording medium and the objective lens, the amount of warping and the cross-sectional shape of the information recording medium is stored in a memory, and a tilt correction signal is generated to change the relative angle between the objection lens and the information recording medium in accordance with radial position by using information of the memory.

30. (New) The optical head according to claim 15, wherein the relative angle detected is a tilt angle in a radial direction of the information recording medium.